IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

REQUEST FOR A U.S NATIONAL STAGE APPLICATION UNDER 35 USC 371 for

APPLICATION OF LeRoy - Payne

PCT SERIAL NO. US00/25535 ART UNIT - EXR.

FILED September 18, 2000

FOR - STRUCTURE FORMING METHOD, APPARATUS AND PRODUCT

Transmitted herewith for the above application are

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___ drawing

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STATEMENT CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) & 1.27(b))—INDEPENDENT INVENTOR	Docket Number (Optional) C19248

Applicant, Patentee, or Identifier: LeRoy - Payne

Application or Patent No.: PCT/US00/25535

Filed or Issued: 18/09/00

Title: STRUCTURE FORMING METHOD, APPARATUS AND PRODUCT

As a below named inventor, I hereby state that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees to the Patent and Trademark Office described in:

- [ ] the specification filed herewith with title as listed above.
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NAME OF INVENTOR	NAME OF INVENTOR	NAME OF INVENTOR
LeRoy - Payne		
Signature of inventor	Signature of inventor	Signature of inventor
3/15/02		
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STRUCTURE FORMING METHOD, APPARATUS AND PRODUCT

This application is a continuation-in-part of pending International application No. PCT/US00/19248, filed July 13, 2000, which in turn is a continuaion-in-part of pending International application No. PCT/US99/21675, filed September 20, 1999, which in turn is a continuation-in-part of pending International application No. PCT/US98/23034, filed October 30, 1998, which in turn is a continuation-in-part of pending International application No. PCT/US96/15499, filed September 26, 1996, which in turn is a continuation-in-part of pending International application No. PCT/US96/05132, filed May 20, 1996, which in turn is a continuation-in-part of International application No. PCT/US95/05450, filed May 4, 1995, now U.S. Patent No. 5,725,716, which in turn is a continuation-in-part of U.S. application Serial No. 239,540, filed May 9, 1994, now U.S. Patent No. 5,496,434, which in turn is a continuation-in-part of U.S. application Serial No. 870,927, filed April 20, 1992, now U.S. Patent No. 5,330,603, which in turn is a continuation-in-part of U.S. application Serial No. 753,344, filed August 30, 1991, now U.S. Patent No. 5,145,282, which in turn is a continuation-in-part of U.S. application Serial No. 521,442, filed May 10, 1990, now U.S. Patent No. 5,049,006, which in turn is a continuation-in-part of U.S. application Serial No. 417,501, filed October 5, 1989, now U.S. Patent No. 4,955,760, which in turn is a continuation-in-part of U.S. application Serial No. 235,205, filed August 23, 1988, now U.S. Patent No. 4,872,784.

This invention relates to a novel continuous structure forming method and apparatus and to a new continuous structure produced thereby.

The present invention provides a novel method, apparatus and structure which overcome the shortcomings of previous expedients. In addition, the method, apparatus and structure provide features and advantages not found in earlier technology.

The method and apparatus of the present invention may be employed by individuals with only limited mechanical skills and experience. Structures can be produced by such individuals safely and efficiently without supervision utilizing the method and apparatus of the invention.

The method of the invention can be modified to form a variety of different structures with the apparatus of the invention. Variations in physical dimensions, composition and surface appearance, etc. can be achieved. Even with such changes, uniform high quality can be maintained without difficulty employing the method and apparatus of the present invention.

A novel method of the present invention for forming a substantially continuous composite structure includes the steps of preselecting a first liquid reactive resin forming material, a particulate solid additive material and a porous blanket. The additive particles are mixed with the first liquid resin forming material substantially continuously to form a substantially uniform mixture thereof. Substantially all of the additive particles are encapsulated with the first liquid resin forming material.

The porous blanket is advanced through the first liquid resin/additive mixture. Part of the mixture is migrated through the blanket substantially uniformly to form a continuous resin matrix within the blanket with the outer surfaces being adhesive.

A thin coating of a preselected second resin forming material which substantially cures immediately upon application is applied to the matrix/blanket. The second resin forming material is applied over both major adhesive surfaces of the matrix/blanket.

A thin coating of a preselected substantially immediately curing resin forming material is applied over a preselected final surface e.g. a path, a ditch, etc. Advantageously, a coated matrix/blanket is advanced into a ditch closely adjacent to its coated sidewall and bottom surfaces until the coated matrix/blanket is disposed in a preselected final configuration.

Pressure is applied to tightly affix the configured coated matrix/blanket to the coated ditch surfaces and form a water impervious liner in the ditch. Advantageously, liquid in the ditch may be utilized to apply pressure against the coated matrix/blanket to tightly affix it to the coated ditch surface.

With ditches of considerable width, iengths of the coated matrix/blanket may be positioned across a ditch from one side to the other, either individually or as part of a pre-formed composite structural assembly. Preferably, continuous reinforcing

elements are combined with a blanket in the formation of the matrix/blanket.

Benefits and advantages of the novel method, apparatus and composite structure of the present invention will be apparent from the following description of the accompanying drawings in which:

Figure 1 is a view in perspective of one form of mobile continuous structure forming apparatus of the present invention;

Figure 2 is a side view of the structure forming apparatus of the invention shown in Figure 1;

Figure 3 is an enlarged fragmentary side view of a positioning module of the structure forming apparatus of the invention shown in Figures 1 and 2;

Figure 4 is a schematic illustration of the positioning of matrix/blankets during the structure forming method of the invention; and

Figure 5 is a fragmentary enlarged cross sectional view of a continuous composite structure of the invention.

As shown in the drawings, one form of novel mobile continuous structure forming apparatus 11 of the present invention includes a supporting portion 12, a material supplying portion 13, a mixing portion 14, a matrix forming portion 15 and a control portion 16.

The supporting portion 12 of the structure forming apparatus of the invention includes a plurality of spaced upstanding frame members 20,21,22,23. A plurality of generally horizontally disposed frame members 25,26,27,28 join adjacent upper ends of the upstanding frame members, and horizontal frame members 30,31,32,33 join lower ends thereof.

Components of the material supplying portion 13, as well as other components such as an operator's seat 29 or electrical generators, air compressors, hydraulic pumps and the like (not shown) also can be mounted on and/or suspended from the frame members.

The material supplying portion 13 of the apparatus 11 includes a plurality of reservoirs 36 operatively connected with the supporting portion 12. The reservoirs are connected independently with the mixing portion 14, preferably through flexible conduit means 37. The material supplying portion also may include hoppers 38 adjacent the mixing portion.

The mixing portion 14 of the structure forming apparatus 11 of the invention includes an elongated mixing chamber 39 adjustably disposed adjacent the supporting portion 12.

The matrix forming portion 15 of the apparatus 11 includes first mixture distributing means 40 adjacent an outlet 41 of the mixing chamber 39 and adjustable downwardly therefrom. The first mixture distributing means 40 as shown in the drawings includes a pair of spaced elongated transversely disposed arcuate members 42,43 with generally horizontal lower edges adjustably oriented closer together than upper edges thereof.

The matrix forming portion also includes second mixture distributing means 44 adjacent the first mixture distributing means 40. The second mixture distributing means advantageously also includes spaced adjustable arcuate members 46,47 disposed in a generally horizontal orientation.

Positioning means 50 is disposed adjacent the second mixture distributing means 44 for placement of a structure 49 in a preselected final configuration while the structure is flexible. The positioning means extends outwardly from the supporting portion 12. As shown in the drawings, the positioning means preferably includes a cantilevered extendable multijointed arm assembly 51 extending from a horizontal cross frame member.

Positioning means 50 advantageously includes a module 53 which includes elongated structure grasping means 52 translatably movable along the cantilevered arm assembly 51 extending from the supporting portion 12. Preferably, the elongated structure grasping means 52 includes a pair of cooperating hinged sections 54.

Pressure applying means 56 may be disposed adjacent the arm assembly 51. The pressure applying means advantageously includes roller means 57 disposed within module 53 adjacent the grasping means 52.

To form a continuous composite structure employing the method and apparatus of the invention as shown in the drawings, a first liquid reactive resin forming material is advanced from a reservoir 36 through a conduit 37 into mixing chamber 39. Simultaneously, other minor ingredients e.g. colors, catalysts,

inhibitors, etc. from other reservoirs (not shown) advance through conduits into the mixing chamber.

At the same time, a particulate solid additive material from a hopper 38 enters the mixing chamber 39. The additive particles are mixed with the first liquid resin forming material substantially continuously, preferably in a proportion significantly greater than that of the resin forming material. During this mixing operation, substantially all of the additive particles are encapsulated with the liquid resin forming material to a preselected thickness.

The resulting mixture being delivered from outlet 41 of the mixing chamber 39 passes downwardly between arcuate members 42,43 into contact with a porous blanket or blankets 34 moving therethrough. The mixture is delivered at a rate sufficient to form a residual pool 35 between the arcuate members. As the blanket exits the liquid pool, part of the mixture migrates through the blanket substantially uniformly to form a continuous resin matrix within the blanket with the outer surfaces being adhesive.

As the treated blanket passes through the second mixture distributing means 44, a thin coating of a second resin forming material which cures substantially immediately is applied to the matrix/blanket. As shown in Figure 2, the thin coating is applied over both major adhesive surfaces.

The coated matrix/blanket 49 then is advanced by grasping means 52 carried by module 53 disposed on the free end of arm assembly 51 and placed into a preselected final configuration such as a ditch while it is flexible and has a thin cured coating of the second resin forming material. Preferably, the lower surface of the matrix/blanket is in contact with a firm base surface such as packed soil or gravel which has a thin cured coating of a preselected substantially immediately curing resin forming material applied by nozzles 55 extending from module 53.

As the coated matrix/blanket 49 is positioned in its final configuration, pressure is applied thereto. Advantageously, this is accomplished with a roller 57 disposed within module 53 as it is advanced by the cantilevered arm assembly 51. Also, as a

matrix/blanket is positioned into a liquid filled ditch, the pressure of the liquid will hold it against the ditch surface.

When the matrix/blanket is properly positioned in its preselected final configuration, the arm assembly 51 and module 53 are withdrawn to receive another length of the coated matrix/blanket. During this action, the roller 57 disposed within module 53 is shifted to an operating position and applies pressure to tightly affix the matrix/blanket to the ditch surface 60.

Thereafter, additional lengths of the coated matrix/blanket 49 are positioned in succession into an overlapping orientation (Figure 4). At the same time, rock 61 can be delivered through passages 58 and/or 59 into the ditch and distributed over the blanket/ditch surface.

To facilitate the creation of a water-tight continuous composite liner structure, it may be desirable in the formation of each matrix/blanket length 62 to allow an area 63 of each adhesive surface to remain exposed when the second immediately curing resin forming material is applied to form the thin coating. Preferably, the exposed adhesive area of one major surface is disposed along an edge remote from the edge adjacent the exposed adhesive area of the opposed major surface of the same matrix/blanket.

As shown in Figure 4, a plurality of coated matrix/blankets 62 are interconnected by positioning a first blanket with an exposed adhesive area 63 along one edge of its upper surface and then positioning a second coated matrix/blanket 64 adjacent to the first placed length 62 with overlapping alignment of the adjacent exposed adhesive areas of the first and second positioned lengths. The exposed adhesive area of the second length is tightly affixed to the exposed adhesive area of the first positioned length.

Thereafter, additional lengths of the coated matrix/blanket individually in succession are positioned and tightly affixed in overlapping alignment of the adjacent adhesive areas to form a substantially continuous composite structure having high strength and exceptional durability. Alternatively, if desired, matrix/blanket lengths may be pre-assembled on a shoulder of a ditch and lowered into place as a plurality of subassemblies.

Advantageously, pressure is applied along the overlapped adhesive surfaces immediately upon the positioning of each succeeding length of the coated matrix/blanket. Preferably, rolling pressure is applied to the overlapped adhesive surfaces.

To produce high quality continuous composite structures of the invention, it is important that all of the steps be carefully coordinated by control portion 16. The control portion 16 of the structure forming apparatus 11 of the invention includes programmable memory means 66 and actuating means 67 responsive thereto in combination with coordinating means 68 to control the operation of the various components of apparatus 11. Preferably, the coordinating means includes a process controller 69 that initiates changes in the flows of materials and speeds of drives to bring variations therein back to the rates specified in the programs present in the memory 66.

This coordination commonly is achieved through the transmission of information such as digital pulses from monitors and/or sensors at the control components to the process controller 69. The operating information is compared with the preselected programming parameters stored in the memory 66. If differences are detected, instructions from the controller change the operation of the components to restore the various operations to the preselected processing specifications.

The reactive resin forming materials employed to produce composite structures of the invention are selected to be capable of reaction to form the particular resin matrix or coating desired in the final structure. Advantageously, the materials form thermosetting resins such as a polyurethane or polyester. Should a polyurethane be desired, one reservoir may contain an isocyanate and another reservoir may contain a polyol.

More commonly, the reservoirs may contain different partially formed materials which upon mixing interact to form the desired polyurethane. Examples of such partially formed materials include so-called "A stage" resins and "B stage" resins.

Other resin forming systems may utilize a resin forming material in one reservoir and a catalyst, an inhibitor, each in other reservoirs. Additional components can be premixed with one

of the resin formers, e.g. fillers, reinforcements, colors and the like.

The particulate solid additive material is mixed with the first liquid reactive resin forming material substantially continuously, preferably in a proportion significantly greater than that of the resin forming material. The additive particles may be any of a wide variety of inexpensive materials readily available at a particular job site. Natural mineral particulate materials such as sand and gravel normally are available or can be produced simply by crushing rock at the site.

Also, materials such as waste or recycled materials which can be shredded or ground into particles of suitable size can be utilized. Particularly useful are particles formed by shredding or grinding discarded tires. Since the particles are encapsulated with the first resin forming material and not saturated therewith, many different waste materials may be employed.

Suitable porous blankets include woven, knit, non-woven structures, etc. The blankets e.g. fabrics, mats, etc. may be formed of continuous or discontinuous fibers, yarns, slit ribbons and similar natural and synthetic fibrous materials. Reinforcing members such as ropes, cables and the like that extend longitudinally and/or transversely of the blanket centerline may be included if desired.

As shown in Figure 5, a cross section of a typical composite structure 70 of the invention includes a thin outer coating 71 of an instanteously cured resin over both major surfaces with the upper exposed surface having a layer of rocks 72 scattered thereover. Thick central sections 73,74 include a plurality of encapsulated solid particles 75 such as sand, gravel, particles from grinding discarded tires, etc. A continuous resin matrix 76 extends throughout each central section. Continuous reinforcing elements 77 e.g. mesh, cables, etc. are disposed between the central sections.

The above description and the accompanying drawings show that the present invention provides a novel method, apparatus and composite structure which overcome the shortcomings of previous expedients and in addition, provide features and advantages not found in earlier technology.

The composite structure produced with the method and apparatus of the invention can include major proportions of recycled, waste or other materials which are readily available at a job site. These structures are of high quality and may exhibit properties not usually found in products formed with conventional ingredients.

The method of the invention may be conducted by individuals with only limited mechanical skills and experience to produce high quality structures safely and efficiently. The method can be modified to form a variety of different structures. Variations in configuration, composition, physical dimensions and surface appearance, etc. can be achieved easily. Even with such changes, uniformity and high quality can be maintained without difficulty.

It will be apparent that various modifications can be made in the particular method, apparatus and composite structure described in detail above and shown in the drawings within the scope of the present invention. The method steps, apparatus components and types of materials employed can be changed to meet specific process and structural requirements.

These and other changes can be made in the method, apparatus and composite structure of the invention provided the functioning and operation thereof are not adversely affected. Therefore, the scope of the present invention is to be limited only by the following claims.

CLAIMS

1. A method of forming a continuous composite structure including the steps of preselecting a first liquid reactive resin forming material, a particulate solid additive material and a porous blanket, mixing said additive particles with said first liquid resin forming material substantially continuously to form a substantially uniform mixture thereof, encapsulating substantially all of said additive particles with said first liquid resin forming material, advancing said porous blanket through said liquid resin/additive mixture, migrating part of said mixture through said blanket substantially uniformly to form a continuous resin matrix within said blanket with adhesive outer surfaces, applying a thin coating of a preselected substantially immediately curing resin forming material over a final base surface, advancing said coated matrix/blanket into a final configuration on said coated base surface, applying pressure to said coated matrix/blanket to tightly affix said coated matrix/blanket to said coated base surface and form a water impervious structure thereon.

2. A method of forming a continuous composite structure according to Claim 1 including the steps of applying a thin coating of a preselected substantially immediately curing resin forming material over sidewall and bottom surfaces of a preselected ditch, advancing said coated matrix/blanket into said ditch closely adjacent to said sidewall and bottom surfaces, applying pressure to said matrix/blanket to tightly affix said configured matrix/blanket to said ditch surfaces to form a water impervious liner therein.

3. A method of forming a continuous composite structure according to Claim 2 including the step of distributing solid particles over said configured matrix/blanket.

4. A method of forming a continuous composite structure according to Claim 2 wherein a plurality of said coated matrix/blankets are sequentially drawn through said ditch and the leading edges thereof affixed to an opposite ditch bank.

5. A method of forming a continuous composite structure according to Claim 2 including the step of applying rolling pressure to said coated matrix/blankets within said ditch.

6. A method of forming a continuous composite structure according to Claim 2 wherein liquid pressure is applied to said coated matrix/blanket to tightly affix said blanket to said ditch surface.

7. A method of forming a continuous composite structure according to Claim 2 including the step of incorporating continuous reinforcing elements with said blanket in the formation of said matrix/blanket.

8. A method of forming a continuous composite structure according to Claim 2 including the steps of applying a thin coating of said second resin forming material over both major adhesive surfaces of said matrix/blanket while allowing an area of each adhesive surface to remain exposed along one edge thereof, the exposed adhesive area of one major surface being along an edge remote from the edge adjacent the exposed adhesive area of the opposed major surface, positioning a first preselected length of said coated matrix/blanket into a preselected configuration while it is flexible and has an exposed adhesive area along one edge of said upper surface thereof, positioning a second preselected length of said coated matrix/blanket adjacent to said first placed length with overlapping alignment of said exposed adhesive areas of said first and second positioned lengths of said coated matrix/blanket, tightly affixing said adjacent exposed adhesive areas of said first and second lengths, and successively positioning and tightly affixing together a plurality of additional lengths of said coated matrix/blanket in overlapping alignment of said respective adhesive areas to form a substantially continuous composite structural assembly, applying a thin coating of a preselected substantially immediately curing resin forming material over submerged sidewall and bottom surfaces of a preselected ditch, advancing said coated structural assembly into said ditch closely adjacent to said sidewall and bottom surfaces, applying pressure to said structural assembly to tightly affix said assembly to said ditch surfaces to form a water impervious liner therein.

9. A method of forming a continuous composite structure according to Claim 8 including the step of applying pressure along said overlapped adhesive areas of adjoining lengths of said coated matrix/blanket to form a tight bond therebetween.

10. A method of forming a continuous composite structure according to Claim 8 wherein pressure is applied along said overlapped adhesive areas immediately upon the positioning of each succeeding length of said coated matrix/blanket in an overlapped relationship.

11. A method of forming a continuous composite structure according according to Claim 8 wherein said positioning of said matrix/blanket lengths and applying pressure thereto are coordinated in a preselected sequence.

12. Mobile continuous structure forming apparatus including a supporting portion, a material supplying portion, a mixing portion, a matrix forming portion and a control portion; said supporting portion including a plurality of spaced upstanding frame members, a plurality of generally horizontally disposed frame members joining adjacent upper and lower ends of said upstanding frame members; said material supplying portion including a plurality of reservoirs operatively connected with said supporting portion, said reservoirs being connected independently with said mixing portion; said mixing portion including an elongated mixing chamber adjustably disposed adjacent said supporting portion; said matrix forming portion including first mixture distributing means extending adjustably downwardly from said mixing chamber and being disposed adjacent an outlet thereof, second mixture distributing means disposed adjacent said first mixture distributing means, positioning means disposed adjacent said second mixture distributing means for placement of a structure in a preselected final configuration, said positioning means including a cantilevered extendable arm assembly pivotally connected with said supporting portion, elongated structure grasping means disposed on said arm assembly, submersible guide means and mixture distributing means disposed adjacent a free end of said arm assembly, pressure applying means disposed adjacent said positioning means; said control portion including programmable memory means, coordinating means, sensing means, actuating means, and circuitry transmitting signals from said sensing means to said coordinating means for comparison with said memory means and activation of said actuating means to form and place a continuous structure into a preselected final configuration while it is flexible and adhesive.

13. Mobile continuous structure forming apparatus according to Claim 12 wherein said elongated structure grasping means includes a pair of cooperating hinged sections.

14. Mobile continuous structure forming apparatus according to Claim 12 wherein said pressure applying means includes roller means.

15. Mobile continuous structure forming apparatus according to Claim 12 wherein said positioning means includes sensing means and actuating means.

16. Mobile continuous structure forming apparatus according to Claim 12 wherein said positioning means includes a detachable submersible module including guide means, mixture distributing means, structure grasping means, pressure applying means, and particle distributing means.

17. Mobile continuous structure forming apparatus according to Claim 16 wherein said submersible module is disposed adjacent said free end of said arm assembly.

18 Mobile continuous structure forming apparatus according to Claim 14 wherein said pressure applying means includes spaced roller means independently movable in a vertical plane.

19. Mobile continuous structure forming apparatus according to Claim 18 wherein at least one of said roller means includes reversible driven roller means.

20. A continuous composite ditch liner structure including an assembly of transversely disposed blanket lengths arranged in an overlapping relationship, each of said blanket lengths including a continuous first resin matrix surrounded by a multiplicity of closely spaced solid additive particles encapsulated with a first adhesive resin forming material, a thin immediately curing second resin coating on both major surfaces of each of said blanket lengths, said second resin coating being compatible and reactive with said adhesive first resin forming material, and a rock layer over an exposed surface of said thin second resin coating.

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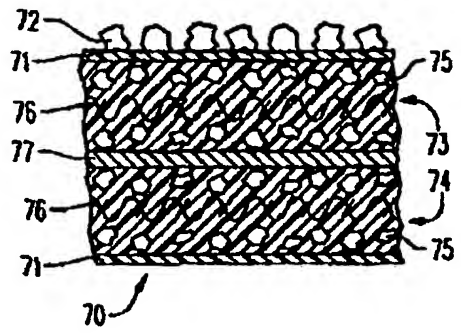

(57) Abstract: A method of forming a continuous composite structure (70) includes encapsulating solid additive particles (75) with a first reactive liquid resin forming material (76) and migrating part of the mixture through a porous blanket to form a continuous resin matrix (76) within the blanket with adhesive outer surfaces. A thin coating of a second preselected resin forming material (71) which substantially cures immediately upon application is applied over both major adhesive surfaces of the matrix/blanket (70). A thin coating of a preselected substantially immediately curing resin forming material is applied over a final base surface, e.g. a ditch. A plurality of coated matrix/blanket lengths (70) are advanced sequentially into a final overlapped configuration on the coated base surface.

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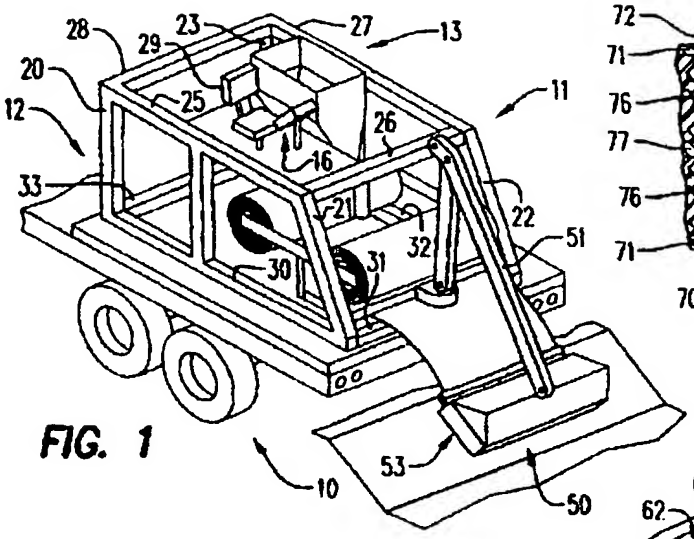


FIG. 1

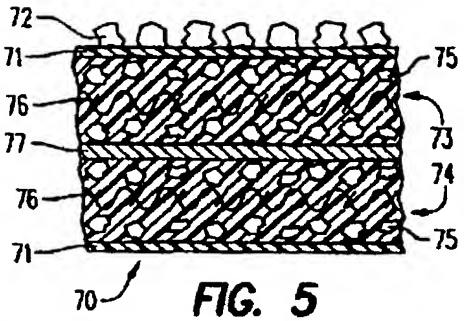


FIG. 5

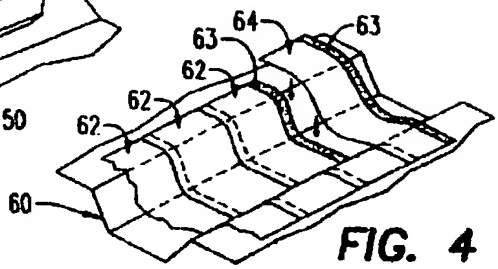


FIG. 4

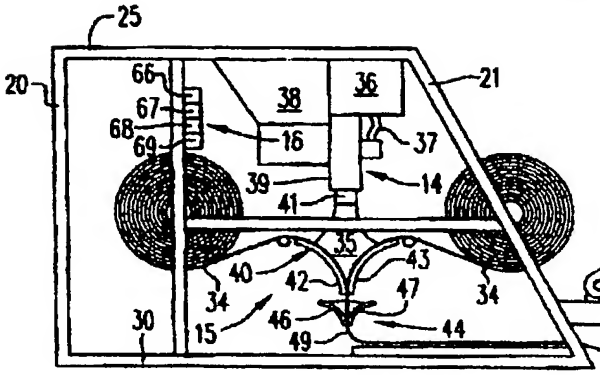


FIG. 2

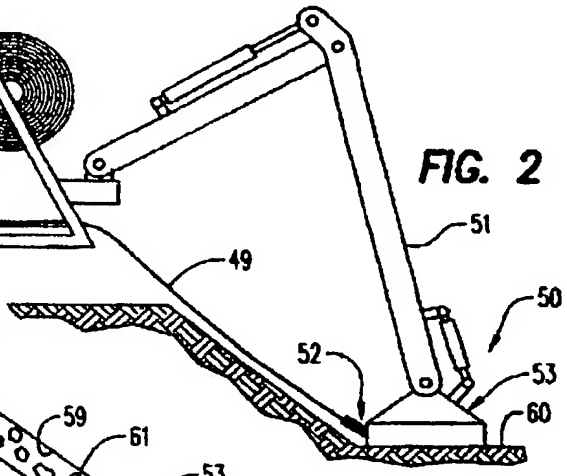
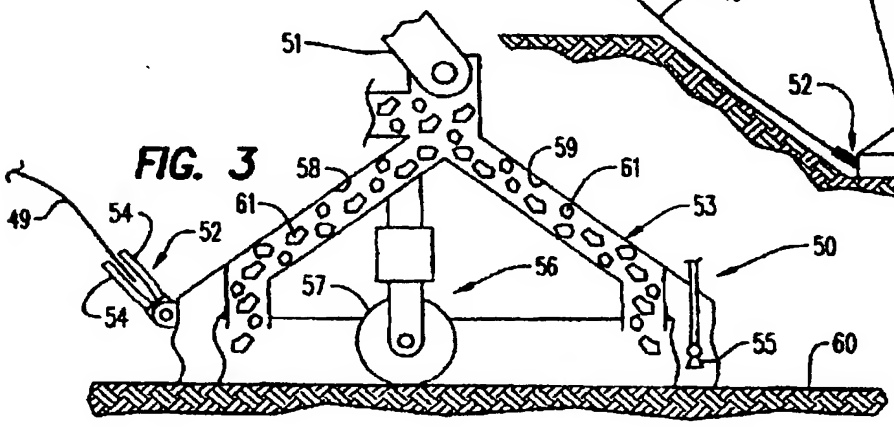


FIG. 3



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DECLARATION — Utility or Design Patent Application

I hereby claim the benefit under 35 U.S.C. 120 of any United States application(s), or 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application or PCT Parent Number	Parent Filing Date (MM/DD/YYYY)	Parent Patent Number (if applicable)
PCT/US00/25535	18/09/00	

☐ Additional U.S. or PCT international application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

As a named inventor, I hereby appoint the following registered practitioner(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: ☐ Customer Number [ ] → *Place Customer Number Bar Code Label here*

OR

☒ Registered practitioner(s) name/registration number listed below

Name	Registration Number	Name	Registration Number
Arthur L. Urban	16,518		

☐ Additional registered practitioner(s) named on supplemental Registered Practitioner Information sheet PTO/SB/02C attached hereto.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name of Sole or First Inventor: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle [if any])	Family Name or Surname
LeRoy	Payne

Inventor's Signature	LeRoy Payne					Date	3-15-02
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City	Billings	State	MT	ZIP	59101	Country	USA

☐ Additional inventors are being named on the ____ supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto